THE JOURNAL OF SCHOOL HEALTH

VOL. XVII No. 6

JUNE
1947

PUBLISHED BY
THE AMERICAN SCHOOL HEALTH ASSOCIATION

AMERICAN SCHOOL HEALTH ASSOCIATION

Organized 1927

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THE JOURNAL OF SCHOOL HEALTH

Published monthly, except July and August, at Buffalo, N. Y.
THE AMERICAN SCHOOL HEALTH ASSOCIATION
3335 Main Street, Buffalo 14, New York

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SUBSCRIPTION RATES TO THE JOURNAL
Membership dues, $2.00, including $1.75 subscription. Subscription $1.75
Single copies 25c, send payment with order

Address all communications to
THE EDITOR, The Journal of School Health
3335 Main St., Buffalo 14, New York

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The American School Health Association

Entered as second-class matter at the Post-Office at Buffalo, N. Y.
October 5, 1937

1+1=1

To state it another way:

ONE	ONE	ONE
level tablespoonful of Pablum (or Pabena) when mixed with . . .	tablespoonful of milk, formula or water (hot or cold) makes . . .	rounded tablespoonful of cereal feeding of average consistency.

To make thicker feeding (as in pylorospasm, pyloric stenosis, etc.), increase the amount of Pablum or Pabena. To make thinner feeding, as in 3-months infants, increase amount of milk, formula or water.

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THE JOURNAL OF SCHOOL HEALTH

Devoted to the interests and advancement of school health service and instruction. Your participation by membership is solicited.

Vol. XVII JUNE, 1947 No. 6

WHAT IS SEX EDUCATION?*

JOHN L. C. GOFFIN, M.D.

Sex can't be defined in a sentence, a paragraph, or a page. To define sex adequately one must define life; and life is far more complex than anything made by man.

The word sex, unfortunately, is in bad repute. Every time a committee meets to plan a program somebody is sure to say, "Can't we find a more innocuous term than *sex* education? Sex is so suspicious, so surreptitious." Every time a speaker prepares a lecture on sex education he must camouflage the title and take refuge behind such wide-meshed screens as "Social Problems," or "Life Problems," or "Family Living," or "Social Hygiene," which could mean almost anything—from good table manners to community sanitation.

I am beginning to suspect that in our futile search for a name for sex education we have been barking up the wrong tree. I think it is not the word itself that has acquired a bad odor but the subject. People read so much in the newspapers about sex crimes, sex delinquency, sex perversion, sex fiends, sex tirangles, that they have come to regard sex with fascinated horror. It has somehow become almost synonymous with extramarital irregularity. Then too, many folks have a very narrow view of sex; they think of it only in terms of the physical act, and "nice" people don't talk about that.

If we make the *subject* respectable the word will be welcome in the drawing room and the school—even on the radio. For there is no other word in the English language for sex—but sex. We have been trying to sneak sex education into people by disguising it with fancy names, like flavoring cod liver oil with wintergreen. It may do the patient just as much good but it doesn't taste any better.

The word sex is derived from the Latin verb *secare,* to cut, to divide. Literally it is "the sum of the anatomical and physiological characteristics that make an animal or a plant distinctively male or female." In the case of man we should add *psychological* char-

*Presented at Southern California Branch, National Conference of Family Relations, October 26, 1946.

acteristics—because the distinguishing characteristic of sex in mankind, compared to sex in the lower animals, is its psychological and social significance. To quote Frances B. Strain: "Sex education is a living, dynamic, day-by-day education. It has no boundaries, no laboratories of its own; for the whole school and the whole world and everything that takes place in them are its laboratory."

Sex doesn't begin at puberty or end at the climacteric. Human beings are sexual beings from the moment of conception, when a sperm cell with an x or a y chromosome penetrates an ovum, until the death of the individual. Sex consciousness begins when infancy ends and boys and girls begin to play together. Girls are mysteries to boys and boys to girls. The little boy wonders why little girls wear their hair long, have dresses instead of pants and are usually less active and more easily disciplined. The little girl wonders why boys get haircuts, wear long trousers instead of skirts, and are usually noisy and dirty. If they are fortunate enough to live in an enlightened home where childhood nudity is looked upon as an opportunity for wholesome sex education instead of an invitation to Satan, the little girl wonders why her brother's genitalia are in full view while hers are inconspicuous; and the little boy wonders why nature has deprived his sister of an apparently necessary organ. It is just as natural and normal for children to wonder and be curious about these matters as it would be for them to be puzzled by the fact that one child has ten fingers or ten toes and another nine or eleven.

It is also normal and natural for children to wonder how they got into the world. Children raised or reared on the farm have a pretty fair idea, but even they don't always hit on the connection, unless they are told; human beings seem different and superior in every way to farm animals. In past generations parents thought such curiosity was abnormal. They thought sex information was useless baggage because their children wouldn't be parents for a good many years. When they did marry they could learn by experience just as they themselves had learned. And, the parents couldn't explain it anyway. So somebody invented the stork myth which gave them an easy out. But children are a lot more observant than most people give them credit for being. They didn't see any stork heliocoptering a baby down the chimney when there was a new arrival—in fact they didn't see any storks. What they did see was the doctor coming with a black bag, sometimes staying all night, and departing with the mysterious bag. A logical mind,

knowing nothing about biology, would naturally conclude that the bag contained the baby—full when the doctor arrived, empty when he departed. This was fine for the parents: a good alibi and the children were protected from the fearsome facts of life. We all know where those children got their information. They got it from people who didn't know; from people who had queer ideas; from people who thought that sex was sinful, or nasty, or funny.

And so, today people are confused. The ratio of divorce to marriage in Los Angeles is one to one; in the nation two to five. Venereal disease rates are mounting. Juvenile delinquency is soaring. Homicides and suicides, because of marital misunderstandings, are common occurrences. Young people are demanding—and taking—sex license. We have far too many hasty, ill-advised marriages which result in broken homes. Ideas of love and romance are taken from novels and movies instead of being based on biological and psychological facts. Psychiatrists say most of the problems they have to deal with have a sex element.

The only way to end this confusion, that I know, is to enlighten all future parents about sex and reproduction and guide their thoughts and actions into socially acceptable channels.

This education involves every adult who has any responsibility for the child's training. By far the most important adult is the parent, usually the mother, but the teacher, the school nurse, the school physician, the counsellor, the preacher—all have definite responsibilities too.

This is because sex education is not narrow and specialized, like trigonometry. No one person can be expected to know all about it. Besides, it is so inseparable from all aspects of living, growing, developing, socializing, and playing a part in family life that many different people need to help supply different parts of the puzzle and supply them at appropriate ages. At high school age somebody needs to unify the whole picture for the adolescent and explain its total meaning in terms of family living. This somebody should be a very wise, well educated, emotionally mature person.

Sex education is concerned with facts and concepts in many fields: biology, anatomy, physiology, psychology, sociology, psychiatry, eugenics, mental hygiene, growth and development, nutrition, and the medical specialties. That's why it is complex and difficult to define. But this complexity need not deter us from teaching it. Character education and education for citizenship are complex too but they have been taught for years—not with too much success.

The prerequisites are recognition of the need and an unquenchable desire to supply that need.

Sex education to be successful must be positive, not negative. We have always had sex training at home and in school but much of it has been negative training. What do I mean by negative training? When Johnnie asks his mother, "Where do babies come from?" and his mother answers, "The doctor brings them," or "You'll find out when you're old enough," that is negative training. When a mother punishes or shames her child because he handles his genitals or wets the bed, that is negative training. When a question about sex comes up in class and the teacher, instead of answering it objectively and constructively, pointedly ignores it or stammers, frowns, or turns red in the face, that is negative training. When a teacher shows plainly by her attitude that she despises men, that is negative training. The rigid segregation of the sexes in some schools is certainly negative training. Negative training is not only ineffective; it is destructive because it may create unwholesome attitudes and cause emotional conflicts. It is the undesirable opposite of sex education.

In the home and in the elementary grades sex teaching must be both incidental and integrated. Incidental teaching may be both accidental and purposeful. For instance, Susie's cat has kittens. You might call that an accident; certainly the cat didn't consciously plan to have a family. Susie tells the teacher about this remarkable event. This gives the teacher an opportunity to explain in simple terms the biology of mammalian motherhood. and, if the children are far enough advanced, to mention some human analogies. Integrated teaching is the discussion of the sex and family relations aspects of a situation in which the sex topic really belongs and where the discussion would be incomplete and sterile without such discussion. For example, in social studies the discussion may center about divorce as a social question. How can the subject be adequately discussed without exploring the sex angle?

In high school, in addition to incidental and integrated teaching, there must be direct instruction in family education in all its aspects. This can usually be done best by outlining units of study. These, however, should be flexible and adapted to the needs of the students. They can be included in science, home economics, social studies, and senior problems courses.

If teachers are going to give any sex education they must understand the development interests and urges of children at

various ages. In general these are egoistic or individual, social, and sexual. These interests and urges are usually intertwined and inseparable. In kindergarten and primary grades children are interested in themselves and in each other and superficially in the difference between each other and the opposite sex. They are intensely interested in babies and they may be interested in where babies come from.

In elementary school, before puberty, children are interested in the mechanics of animal and human reproduction in an impersonal sort of way. We must distinguish between sex *interest* and sex *impulse*. Sex impulse or urge does not begin until the onset of puberty. Upper elementary pupils, however, some of whom are already pubescent—need to have a genito-urinary vocabulary and a correct understanding of the fundamentals of reproduction as a corrective to vulgarity and a preparation for later family life education. It makes a great deal of difference also if a child knows that its father is biologically as well as economically indispensable.

Junior high school students, who are in the stage of early adolescence, are acutely conscious of developmental and sexual differences both among members of the same and the opposite sex. They are beginning to be sex conscious and to be attracted to the other sex. This attraction may often seem like repulsion to adults because it is shown in strange ways e.g., by physical and mental teasing. Pushing, pinching, exhibitionims, mild insults, etc., are blundering efforts by boys to attract the attention of the girls. These actions are intensified in pupils who have had negative sex training. In the same way the silly giggling of girls may be a form of exhibitionism unconsciously designed to attract boys. Boys learn that girls have menses and they want to know why, and why this function is sometimes incapacitating. They want to know if they have something corresponding to menstruation and wonder if nocturnal emissions are analogous.

Senior high school students are interested in love and romance. The girls are interested in courtship and marriage. Normal girls are thinking of marrying and having babies. They are interested in making themselves attractive to men. Because they are two or three years ahead of boys in development, they are often interested in older men. Boys are interested in social affairs, and sex plays a large part in their thinking. As a rule they are not as interested in marriage and parenthood as girls.

These interests of different ages of boys and girls will determine the kind of sex education that should be given. Because the

development or biological age differs so widely from the chronological age in many children, they can't be rigidly separated. This complicates the problem somewhat. But the difficulty is not insurmountable. Individual counselling will fill the gaps.

But probably the greatest problem in sex education is reconciling the biological urges of youth with a late marrying, monogamous society.

We must pull sex out of the gutter and make it respectable again. We must make young people realize that sexual relations are clean, wholesome, and desirable. They must learn also that the sex impulse must be controlled and expressed only in marriage. Extra-marital sex experiments lead only to dissatisfaction and unhappiness. Sexual compatibility, on the other hand, is one of the necessary cornerstones to a successful marriage. Good marriages in which both parents have had proper sex education is the surest way to solve the divorce problem. It will also remove the venereal disease threat. Without promiscuity and prostitution there would be little or no venereal disease.

The real bottleneck in sex education today is the lack of preparation of teachers. Questionnaires show that parents are ready and anxious for sex education in schools. But some of them are dubious about the kind of teaching that will be given. In addition to working toward better in-service training, we must arouse the colleges to put into their present courses some sound sex education.

Without a well integrated program of sex education in school, from kindergarten to high school, the schools are not really educating children to understand themselves and to face life successfully. If this vital ingredient is omitted, children are only partially educated.

Sex education is the greatest challenge that faces us today. We can ignore the challenge and go on muddling through or we can face it courageously and create a happier, better adjusted society. We are accepting the challenge. Our chief concern must be that we do the job right. If we realize that we don't know very much about sex education and that we must learn more about it—re-educate ourselves—then we cannot fail. Reprinted from the *Los Angeles School Journal*, February 17, 1947, page 12.

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DAYLIGHT IN THE SCHOOLROOM*

WINIFRED HATHAWAY

Outdoor light far exceeds indoor illumination. The educator is therefore anxious to know how much light is necessary for efficiency, ease and comfort of seeing. There is no answer that will meet the needs of every individual. The amount is determined by the type of eye task that is to be performed and the condition of the eyes that are to perform it. Young eyes are growing eyes and light is one of the essentials for their healthy development. Some time ago it was decided that even before any answer concerning desirable quantities of illumination to meet varying needs could be suggested, a way must be found to measure illumination. In order to avoid the difficulties arising from differences in units of measurement—a yard in one country, a meter in another—a unit of measurement of light must be agreed upon. After much research, a foot-candle was finally selected as this unit—the amount of light from a standard candle falling on a surface one foot distant in any direction from the light source. In order to make the necessary research, precision instruments had to be devised, but these were too expensive for general use, hence a small light meter was made available which, although not scientifically accurate, is proving a satisfactory aid in determining approximate amounts.

But again the question, how much light? A group of experts, after giving much study to the question, recently decided that a maintained minimum of 30 foot-candles be recommended for school lighting, with increased amounts for exacting eye tasks. To obtain the desired minimum in school buildings, natural light would have to be supplemented, in practically all cases, by artificial illumination. But since natural light is the most desirable, every effort should be made to use to advantage all that is available. In order to do this many things must be taken into consideration: the orientation of the school building, the effects of climate, and seasonal and diurnal changes.

The initial step, therefore, is so to plan the school building that the best possible natural light may result. But this would be of little value unless such light were correctly used. On a clear, sunny day approximately 200 foot-candles may be obtained on working surfaces near the window. According to the law of physics, this decreases according to the square of the distance from the light source. Hence on working planes farthest away from

*Abstracted from *The Sight Saving Review*, Winter, 1946, Vol. XVI, No. 4.

the windows there may be too little light for the meter to register. In planning the building, consideration must be given to the fact that the best light comes from the top of the windows. If these are low, desirable light will travel only a short distance across the room. In order, therefore, to obtain the best results, glass area should reach as near to the ceiling as possible and no room should be wider than twice the height of the windows from the floor. Glass area should approximate twenty per cent of the floor area. Narrow mullions between windows help increase the glass area and prevent shadows.

Windows should be placed as near to the back wall as possible in order to provide illumination for seats in that area. They may also extend near to the front wall provided that seats are correctly placed and a type of chalkboard installed that does not cause a glare. Glare not only interferes with comfort and ease of seeing, but with efficiency. The part of the front wall nearest the windows may be covered with tagboard or burlap and used for bulletin or display material.

Much has been written about unilateral lighting to the left of the pupils. Recent researches indicate that variations from this are permissible and probably will result in satisfactory illumination, provided that windows at the back or at the wall side of the room are placed high enough above the floor to prevent crosslights and shadows or the shadow of the child from falling on his work.

But no matter how much illumination is provided, unless ceilings and walls reflect the light, little is gained. A white ceiling has a reflection value of approximately 80 per cent. Light gray-green or cream walls reflect anywhere from 50 to 70 per cent, whereas dark brown or dark green walls give back only approximately 7 per cent of the light that falls upon them. Glossy ceilings, walls and woodwork, on the other hand, cause a reflected glare which may be sufficiently irritating to affect not only efficiency, comfort and ease of seeing but the general health of the child.

Recent researches point to the benefit resulting from light-colored floors as well as from light-colored walls and woodwork and also indicate that desks and other furniture in the room should be light in color because of the good reflection value, and also to prevent too great a contrast between the desk top and the white or light cream paper in current use.

Light, gray-green chalkboards not only harmonize with the rest of the room and have high reflection value, but offer sufficient contrast to white chalk to insure good visibility. In many classrooms blackboards on three sides of the room "eat up" most of the

light intended for the children. If such boards have been installed and cannot be replaced, covering them when not in use with light-colored shades will be of help.

Since the best light comes from the top of the widows it is evident that shades should not be hung there. The most satisfactory plan is to place at the center of each window two buff or light gray shades of translucent material of a texture that will not crack, one shade to pull up and the other, down, with a metal bar between rollers to prevent streaks of light. It is poor economy to place the roller of the upper shade below the other. In such case, in order to be able to manipulate the shades, one of the rollers must be fastened further out than the other, causing that shade to pull away from the window at the sides, thus allowing irritating streaks of light to enter the room. All shades should be wide enough to prevent a similar result. This usually means that unless the windows are deeply recessed, rollers must be fastened to the mullions.

The arrangement of seats and desks is an important factor, especially if unilateral light is provided. The rows of desks nearest the window may be turned away from them at an angle sufficient to prevent glare from the skyline, but not great enough to cause the child's shadow to fall on the working plane. As the rows recede from the window, the angle may be lessened so that all children face the front chalkboard, thus avoiding strained and uncomfortable posture. Seats and desks should not only be movable and adjustable and in a size suited to the individual, but should be adjusted as necessary according to the growth of the child. Desks that lift to an angle add to efficiency and comfort of seeing by making possible desirable focusing of the eyes and providing increased illumination; they are also an aid to correct posture. In cases in which such desks cannot be obtained, desk easels may be made by the pupils in the school workshops.

The left-handed child should be given special consideration. His seat and desk should be so placed that light will come over his right should and thus prevent the shadow of his hand from falling upon his work and interfering with efficiency of seeing.

The eye condition of all pupils should be taken into account. If it is such that the eyes are unable to carry their full share of the complicated process of seeing, eye tasks must be made easier and illumination increased. People with astigmatism need much more light than those with so-called normal vision, hence special consideration should be given to the placement of seats for astigmatic children. Careful attention must also be given to children with photophobia, especially to albinos to whom glare is intolerable.

In the great majority of classrooms the natural lighting must, of course, be supplemented by artificial illumination if desirable results are to be obtained. Installations, whether of incandescent or fluorescent lamps, must be so carefully considered that the accepted requirements are met—a sufficient amount of light for the task to be performed, correctly diffused, distributed and directed, and—perhaps most important of all—without direct or reflected glare.

Modern educational ideas stress the participation of those directly concerned. If the principles of illumination and the effect not only on eye health and efficiency but on the general health are understood by the teacher and explained to the pupils in a way they can understand, they will be interested in using the light meter, arranging seats and desks in the most desirable positions, covering glass doors or transoms that cause a glare, repainting shiny geography globes, removing glossy surfaces from desks and refinishing them in a light stain in dull finish, and placing shades correctly to control natural illumination.

* * * * *

Dr. Godfrey Retires,—Dr. Edward S. Godfrey, Jr., state commissioner of health, retired May 1, after nearly thirty years in the state department of health. After graduation from the University of Virginia Department of Medicine, Charlottesville, he served both Arizona and Illinois before becoming epidemiologist in the New York State Department of Health. In 1920 he was appointed director of the division of communicable diseases and in 1931 director of local health administration. From 1928 to 1935 he served part time as clinical professor of epidemiology at the Columbia University College of Physicians and Surgeons. In 1936 he was appointed state commissioner of health. Dr. Godfrey has contributed many articles to the literature on public health, notably the report of a study of measles in children's institutions in the state outside of New York City. He is a member of numerous public health and medical societies. *Journal A. M. A.*, May 31, 1947, p. 472.

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EDITORIAL

The Journal of the American Medical Association for April, 1947, p. 1229, carries a report—reprinted on page 174 of this Journal—of the closing by the Health Department of several filthy restaurants in New York City.

Human ignorance, carelessness and neglect will result in some closing of restaurants in a large city, but what excuse is there for permitting a repeatedly filthy one to continue in business?

The manager of one of these disease breeders had been fined three times since last September for violations of sanitation. Two other places had been fined in court and one had no permit to operate anyhow. These people apparently had little intention of obeying the law. What, to them, would be the possible sacrifice of a life?

Perhaps a few days of meditation set aside in jail would improve their efforts.

The whole matter of health protection in restaurants and other eating places cries aloud vocifierously for improvement. Not only are the places themselves dirty, but their facilities for cleanliness are inadequate and are handled in a slovenly, dangerous manner.

How frequently is the very desirable rule against "loose" milk broken, and with impunity?

Several times each year we read in Health Department reports, and in the daily press, of groups of people being dangerously

ill because of lack of adequate refrigeration of custards, cream fillings and salads, or because these have been handled by dirty persons having pyogenic-infected hands.

Dirty dishes and drinking glasses are common. This writer has seen glasses in a small restaurant along a main highway—a bus stop eating place, too—so dirty that it was impossible to see through them. A request for a clean one produced another quite as dirty. We went elsewhere and drank only coffee. This was probably safe, before it went into the cup anyhow.

Not rarely we see in local newspapers letters written by disgusted patrons complaining of filthy glasses in "taverns" and elsewhere. We have seen no reports of these tavern keepers being haled into court and compelled to "clean up or shut up."

Ignorant lazy carelessness by food handlers is a constant menace. Recently within a mile of where this is being written the writer has seen butter pats served with the fingers instead of with a fork. Of course we shall not return to that place.

It seems to us that one of the major duties in health education is to instruct in food and restaurant cleanliness. A vigorous campaign for cleanliness in food preparation and serving and in eating-house sanitation would save many. More important, when it became known that the children were discussing food and utensil cleanliness their ideas would spread into home and community, and many slovenly filthy places would be cleaned up, either by pressure of public opinion operating directly, or by pressure upon inspectors and judges.

The summer—with its greater heat, wide travel into strange environment and the risks of food inadequately refrigerated and carelessly handled—often by part time workers— is upon us. At least let us hammer some cautions into the youngsters as to how they may protect themselves. A phobia is not necessary, but all of us can "stop and look" before eating in strange places. C. H. K.

* * * * *

MEETINGS

The American School Health Association with the American Public Health Association at Atlantic City, N. J., October 5-9, 1947.

The National Tuberculosis Association, San Francisco, Calif., June 15-20, 1947.

The New England Health Conference, at University of New Hampshire, Durham, N. H., June 16-18, 1947.

* * * * *

FRANCIS E. HARRINGTON, M.D.

Francis E. Harrington, M.D., former Public Health Commissioner of Minneapolis, Minnesota, and Director of School Hygiene for the public schools of that city, died recently at West Palm Beach, Florida.

Dr. Harrington was born at Norfolk, Va., educated in the Washington, D.C., schools, graduating from high school there in 1899. He received his medical degree from what is now George Washington University in 1904.

He practiced medicine in Washington, D.C., and served as medical inspector of the District of Columbia until 1910. During World War I he served in the United States Public Health Service.

He served as Commissioner of Public Health, City of Minneapolis, Minn., 1920-1944, and during most of that time was also director of School Hygiene in the Minneapolis Public Schools, employed by the Board of Education. This was probably the first instance in this country of one person serving in both these offices at the same time.

He was particularly interested in the problems of tuberculosis control. Under his guidance and direction the Lymanhurst School for tuberculous children was established.

From 1937 to 1945, Dr. Harrington also served as Superintendent of the Minneapolis General Hospital, serving in this capacity without financial compensation.

Dr. Harrington was an able and conscientious physician and health officer. He held many offices in the field of public health in such bodies as the American Public Health Association and the American School Health Association, being for a number of years a member of the Governing Council of the American School Health Association. C. H. K.

* * * * *

CANADA

Survey of Milk Supplies,—In a recent survey in the eight provinces outside Ontario it was revealed that of the 366 municipalities represented only 13 per cent have compulsory pasteurization by-laws. Ontario was excluded because it is the only province which has a province-wide law in force. Of cities and towns in Saskatchewan 20 per cent reported safe milk by-laws; Quebec was second with 15 per cent; ninety municipalities, or 20 per cent, reported that their supply was unpasteurized; sixteen revealed that while they had no compulsory law their supply was 100 per cent pasteurized. Forty-one municipalities revealed that 90 per cent or more of their milk supply was pasteurized. *Journal A. M. A.*, May 31, 1947, p. 474.

ABSTRACTS AND NOTES

Air-borne Infections,*—For several decades prior to 1934 it was generally believed that the acute respiratory and contagious diseases were spread largely by contact. Since that time, however, it has been clearly established that the air of enclosed spaces may become heavily contaminated with a variety of pathogenic micro-organisms, and that certain specific infections may be transmitted to experimental animals by the aerial route. These observations have led many students to question the predominant role of contact in the spread of infection and to undertake investigations in the attempt to control disease by the application of engineering methods to the disinfection of air (sanitary ventilation) and to the prevention of aerial contamination (dust suppression).

The routes by which these types of infectious agents travel from one individual to another may be classified under four general headings:

1. *Contact*, transmission directly, as in kissing, or indirectly by contaminated hands, toys, surgical instruments, or other material objects.

2. *Droplets*, transmission directly by projection onto the conjunctivae, mouth, skin, or open wounds.

3. *Droplet nuclei*, transmission indirectly by inhalation of the small residues which result from evaporation of droplets, and which may remain suspended in the air of enclosed spaces for long periods of time.

4. *Dust*, transmission indirectly by inhalation or settling of larger particles which arise from secondary reservoirs of infection on floors, clothes, or bedding, and which remain suspended in air for short periods of time.

The spread of infection by contact or by droplets is subject to control by methods which influence human behavior or restrict individual activity, such as the promotion of personal hygiene, isolation, quarantine, aseptic techniques, and barrier nursing. The spread of infection by droplet nuclei and dust is an environmental problem amenable to attack by methods of air sanitation.

The methods of controlling air-borne infection have developed in four principal directions: (1) mechanical ventilation, (2) ultraviolet irradiation, (3) disinfectant vapors, and (4) dust suppression. In developing those procedures, the usual criteria of effec-

*Report of the Subcommittee for the Evaluation of Methods to Control Air-borne Infections, of the Committee on Research and Standards.
Organized 1945. First report: Presented before the Epidemiology Section of the American Public Health Association at the Seventy-fourth Annual Meeting in Cleveland, Ohio, November 14, 1946.

tiveness have been the reduction: (1) of test organisms added to air, (2) of the total bacterial count of air, (3) of certain microorganisms usually found in the nasopharyngeal tract, and (4) of certain specific pathogens such as beta hemolytic streptococci or influenza virus A. While bacteriological criteria have been of great practical value in the development of the procedures, they are insufficient. The final criterion of effectiveness must be the demonstration of a significant reduction in the incidence of disease in well controlled studies in human populations living under natural conditions.

Ventilation—Simple ventilation by means of open windows has been a common hygienic practice for many years. Its use has been traditional in military barracks where it has been notable for its unpopularity among troops and the difficulty of its consistent enforcement. British workers have recently reemphasized the desirability of open window ventilation in contagious disease wards. Although it is probable that such measures may have considerable effect in reducing the bacterial contamination of the air, they are obviously expedients of limited value which are subject to variable climatic conditions and which may cause extreme discomfort.

Ultra-violet irradiation—The bactericidal action of ultra-violet light is well established and accurately defined. The effectiveness decreases rapidly with increasing relative humidities above 55 to 60 per cent. The rays are more efficient against small particles, such as droplet nuclei, than large particles, such as dust and lint, in which microorganisms may have a protective coating impermeable to the bactericidal rays. Since germicidal intensities are damaging to the human skin and conjunctivae, radiation must be restricted to the upper air or to carefully placed light screens or barriers at the entrance to rooms or to isolation cubicles. Under standardized test conditions practical intensities of ultraviolet light have been shown to have a marked effect in lowering the bacterial contamination of the air equivalent to 100 or more air changes an hour. Under field conditions, this degree of effectiveness is not always reached; but, nevertheless, a pronounced effect may be induced.

The development of the low pressure mercury vapor tube, of carefully designed fixtures, and of accurate photometers to measure intensity makes possible the safe and reasonably economical installation of ultra-violet lights in a variety of circumstances. Each particular environmental situation, however, presents a specialized problem which requires the expert consultation and continued supervision of ventilation and irradiation engineers.

Irradiation of the upper air of schoolrooms in Swarthmore

and Germantown, Pa., has been carried out continuously since 1937. During the early part of this period, two epidemics of measles were apparently prevented among children in the primary grades whose rooms were irradiated, although large epidemics occurred among the less susceptible children in the secondary grades whose rooms were not irradiated. Beneficial effects in the reduction of the incidence of chicken pox have also been reported, although the procedure was less successful in controlling an epidemic of mumps which occurred in the early fall of 1941 when relative humidities were high.

The application of ultra-violet rays in the schoolrooms provides a very valuable approach to studying the importance of airborne spread of infection, but the extent to which this procedure should be applied generally is uncertain. More extensive studies, now in progress, should add materially to our understanding of the problem.

Disinfectant vapors—Numerous vapors have been shown under experimental conditions to have a powerful bactericidal effect in air. Among these are hypochlorous acid gas, lactic acid, iodine, and certain glycols. Triethylene glycol appears to be the most adaptable for general use because of its high bactericidal potency, its reasonable cost, and its freedom from odors, toxicity, and corrosiveness to metal surfaces. The mechanism of action of this vapor has been carefully studied. Its bactericidal effect depends upon its relative saturation in the air rather than upon the total concentration.

Glycol vapors are more effective against small particles or droplet nuclei in the atmosphere than they are against larger dust particles. The most effective reduction in bacterial contamination has been observed when glycol vapors have been used in conjunction with dust suppressive measures.

Dust suppression—The application of light paraffin or spindle oil to the floors of military barracks and army hospital wards has been shown to be a simple and effective procedure for laying dust and thereby reducing the bacterial contamination of the air resulting from sweeping or other activity. A saturation dose of oil to unvarnished soft wood floors remains effective for a period of three months or longer. More frequent treatments may be necessary for hardwood floors. The procedure cannot be used for concrete, linoleum, or waxed surfaces, but the daily use of oiled sawdust or oiled mops during sweeping is quite effective.

Controlled studies—As yet, an insufficient number of adequatelly controlled studies have been reported upon which to base

any general conclusions. Only certain tentative indications may be outlined at the present time.

Conclusive evidence is not available at present that the air-borne mode of transmission of infection is predominant for any particular disease. There is no justification for the conclusion that the traditional methods of controlling contact infection can be ignored or relaxed.

There is need for more precise knowledge regarding the epidemiology of acute infectious diseases in crowded populations. For example, recruits in military training camps generally experience an unusually high incidence of acute respiratory disease and atypical pneumonia during winter months. During the war years, devastating epidemics of beta hemolytic streptococcal infections and acute rheumatic fever occurred in certain camps. The value of air sanitation for controlling these epidemics depends upon the extent to which the infections may be air-borne. The conduct of controlled studies using various techniques of disinfecting air and suppressing dust is one of the few means of answering this question.

Conclusions—The subcommittee offers the following five points to summarize its group judgment concerning the persent status of the application of engineering methods to control air-borne infection:

1. The oiling of floors, blankets, and bedding has now developed to the point of practical application in the supression of dust. Such measures constitute good housekeeping. They reduce bacterial contamination of the air, but there is as yet insufficient evidence that they prevent disease. Dust suppression should be applied wherever practicable in conjunction with ventilation, ultra-violet irradiation, and disinfectant vapors, when the latter methods are employed.

2. The available evidence strongly indicates that methods of air disinfection (ventilation, ultra-violet irradiation, and glycol vapors) are useful adjuvants to aseptic techniques in the reduction or elimination or air-borne infections in operating rooms and in contagious disease and pediatric wards. Installations are indicated under conditions where there has been demonstrated or there exists potentially a significant incidence of cross-infection or a serious risk to patients. It is essential that competent engineering supervision be available to insure the adequacy of the original installation, to maintain its continued effectiveness, and to protect both personnel and patients.

3. It is not yet possible to compare the relative efficiency of

ultra-violet irradiation and glycol vapors. Only the former method has been developed to a point of practical application. Recent designs of glycol vaporizers and automatic control devices give promise that adequately controlled studies may be conducted in the near future. The relative merits of the two procedures will involve such problems as cost, safety, and the consistency of effective operation based upon long experience.

4. The general use of ultra-violet irradiation or disinfectant vapors in schools, barracks, and in specialized industrial environments is not justified at the present time. There is great need for further carefully controlled field studies to define the mechanisms of the spread of infectious disease among these types of populations.

5. There is no justification for the indiscriminate use of ultra-violet light or other methods of disinfecting air in homes, offices, or places of public congregation. *Abstracted from *The American Journal of Public Health*, Jan. 1947, page 13, by Chas. H. Keene.

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Ultra Violet Air Sterilization,—The epidemic incidence of acute respiratory infections in children's institutions has always been a serious problem which interferes with optimum results in the children's care, and increases the necessary length of stay and the per patient day cost.

In the children's wing of the Convalescent Branch of St. Luke's Hospital in New York this problem has often been acute. This hospital draws the major portion of its patients from the wards and clinics of the parent institution and the average yearly admissions total about 300 children with 10,000 to 12,000 patient days care.

In past years the epidemics of acute respiratory diseases occurred during the winter months and reached such proportions at times that admissions had to be restricted and the complete child population put on bed care in order to cut down the number of contacts.

Wells, Koller, Henle, Hart and Wheeler have reported on the effectiveness of ultra violet air sterilization in killing air-borne bacteria. It has been shown by experimental workers in the General Electric Company laboratories that the wave length most efficient in killing air-borne pathogens is 2537A.

Koller has developed specifications for the installation of radiant units, hung on the side walls, seven feet above the floor and so baffled that only the upper half of the room is irradiated.

Such an installation will effect a sanitary ventilation equivalent to at least 100 complete air changes per hour. Higgons and

Hyde report that in their experience there have been no deleterious affects from the lights. The children have no difficulty in sleeping in the faint glow which resembles moonlight and sufficient light is afforded at night to obviate the necessity for night lights for nurses. The attendant staff soon noted that the usual children's institution odor had completely disappeared, and some of the nurses commented upon the freshness of the atmosphere, comparing it with that experienced at higher elevations.

Complete coverage of the whole building is essential as it has been shown that air currents from unsterilized portions of the building carry pathogens to the children in distant locations and also may infect children in transit through the unsterilized areas.

It was found that diminution in the output of the bulbs caused increased incidence of infection. When the efficiency of the lamps falls below 75 per cent of their original output the incidence of infection rises. For this reason the output of each bulb was tested periodically with a Luckiesh-Taylor Ultra Violet Meter.

In discussing proper care of the lights the necessity for frequent dusting must be mentioned as an accumulation of dirt on the bulbs results in a rapid decrease of their output. Porters using stepladders which raise their heads to the seven foot level must wear sun glasses to protect their eyes. Careless exposure of the eyes or skin results in a superficial erythema which is uncomfortable but not serious.

This study shows the comparison of institutional respiratory diseases during the three year period from October, 1939, to October, 1942, without the benefit of ultra violet air sterilization as compared with the three year period from October, 1942 to 1945 with the sterilizing lamps in operation. Only those children showing temperature readings above 100 degrees by rectum and showing symptoms or signs of respiratory infection were included in the study.

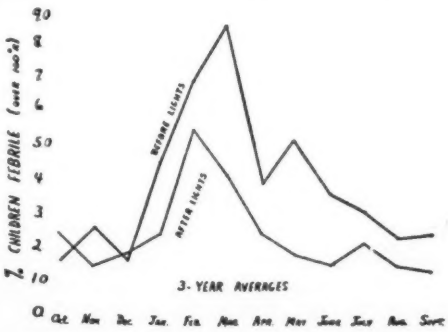

FIG. I. Average curves showing percentage of febrile children in periods, before and after air sterilization.

Table I indicates the results of this study and shows that there was a reduction of 33 per cent in the actual number of children febrile from respiratory diseases for the treated years as against the untreated years.

It was found necessary to keep the lights on continuously both winter and summer although the good effect of the lights was most noticeable during the winter months.

Higgons' and Hyde's experience with contagious disease outbreaks has been limited but they feel that the lights are of definite benefit in the control of such outbreaks. However, contagion due to direct mouth to mouth contact between ambulant children at play cannot be safegarded against entirely by the use of ultra violet air sterilization. They believe that the lights effectively prevent air-borne distant spread of infection thereby preventing mass epidemics among the inhabitants of institutions.

Because of these convictions they feel that the original installation cost of about $2,000.00, and the maintenance cost of about $500.00 per year, needed to keep 50 lamps operating at an output above 350 microwatts per square centimeter at one foot at all times, is justifiable for any institution.

Comment—The evidence presented in this article quite definitely points out that ultra violet air sterilization decreases the incidence of respiratory infection within an institution.

Studies have been conducted, and are now being carried on, to determine the value of air sterilization in school rooms where children are assembled for only a part of each day. As school health workers we will hope to receive more definite information within the next year or two as to the value of the use of ultra violet irradiation in classrooms. Abstract of "Effect of Ultra Violet Air Sterilization Upon Incidence of Respiratory Infection in Children's Institutes, by R. A. Higgons, M.D., and G. M. Hyde, M.D. Abstract and comment by Wm. E. Ayling, M.D., Health Director, Syracuse Schools. Abstracted from *New York State Journal of Medicine*, Volume 47, April 1, 1947.

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Air-Borne Infections,—When any new procedures are introduced in public health, we must expect a swing of the pendulum between extremes of enthusiastic acceptance and of cautious negation. The time seems ripe for a review of recent trends of thinking in Aero-Epidemiology.

The first of the articles in question was the Report of the Subcommittee for the Evaluation of the Control of Airborne Infections

of the American Public Health Association Committee on Research and Standards, under the chairmanship of J. E. Perkins. This report deals particularly with the control of the spread of disease by droplet nuclei and airborne dust, considering "droplets" as distinct from "droplet nuclei," to be a form of direct contact infection. It points out that the value of control of secondary infections by irradiation in operating rooms has been impressively demonstrated; that striking results have been reported as to control of communicable diseases in contagious pavilions and pediatric wards; that irradiation of the upper air of schoolrooms in Swarthmore and Germantown, Pa., apparently controlled two epidemics of measles and showed beneficial results in an epidemic of chicken pox. Mumps, which prevailed at a time when relatively high humidity existed (under which conditions ultra-violet light is least efficient) showed less clear results. At Camp Sampson, a group of naval personnel protected by irradiation showed a 25 per cent lower incidence of "respiratory admissions" than did a control group. There seems no reason to doubt that the use of glycol vapors, in aerosol form, might produce similar results; but no similar controlled epidemiological investigations have been made with these disinfectants.

The major conclusions of this report may be summarized as folows:

"The oiling of floors, blankets, and bedding has now developed to the point of practical application in the suppression of dust. Such measures constitute good housekeeping. They reduce bacterial contamination of the air, but there is as yet insufficient evidence that they prevent disease.

"The available evidence strongly indicates that methods of air disinfection (ventilation, ultra-violet irradiation, and glycol vapors) are useful adjuvants to aseptic techniques in the reduction or elimination of air-borne infections in operating rooms and in contagious disease and pediatric wards.

"The general use of ultra-violet irradiation or disinfectant vapors in schools, barracks, and in specialized industrial environments is not justified at the present time. There is great need for further carefully controlled field studies to define the mechanisms of the spread of infectious disease among these types of populations.

"There is no justification for the indiscriminate use of ultra-violet light or other methods for disinfecting air in homes, offices, or places of public congregation."

A second important review was presented by the Committee

on Sanitary Engineering of the National Research Council under the chairmanship of Abel Wolman. This report first discussed somewhat inconclusive results on dust suppression by oiling at Fort Bragg and elsewhere; and much more striking results obtained in the British and Canadian armies. The British studies showed a rate for respiratory disease incidence of 7 per 1,000 in barracks where the floors were oiled as compared with a control figure of 38 per 1,000; and the Canadian data led to the mandatory oiling of floors in all Canadian army buildings. So far as irradiation is concerned, the Camp Sampson results are cited in some detail. In all these experiments, laboratory tests and tests for beta-hemolytic streptococci showed a marked decrease in air contamination. With regard to disinfection by the use of glycol vapors, similar reductions in bacterial content have been reported; but data on actual decrease of disease by this procedure in American and Canadian barracks and at the Lockheed Aircraft plant were much less significant than in the case of irradiation. The committee concludes that "the oiling of floors and blankets and, in hospital wards, of sheets and pillow cases, has been shown to be a practical, cheap, and effective measure;" and feels that this procedure should be employed either with or without means for air disinfection. As to disinfection by irradiation or by glycol vapors, it is concluded that these procedures "may have a measurable effect upon the attack rate from certain respiratory diseases, but experience is not sufficient to justify drawing definite conclusions." The committee therefore, "does not recommend the general use of these disinfecting devices for the present."

All observers seem to be agreed on the value of dust suppression in such places as barracks and hospitals.

Air disinfection may also be considered to have "arrived" as a procedure which is certainly advisable in the operating room and highly desirable in the contagious disease pavilion and the pediatric ward. Its extension beyond this point is, at present, still problematical.

Committees of the National Research Council and the American Public Health Association have studied and reviewed the data on such installations—glycol vapors and ultra-violet radiation. Within the past several weeks, these two committees have separately submitted reports. Both of these committees feel that the use of either glycol vapors or ultra-violet radiation is still purely

in the experimental state and that the data collected so far do not warrant the installation of such equipment in public buildings and industry in the hope of cutting down upper respiratory infection. It must be emphasized that direct unshielded ultra-violet radiation of sufficient intensity to kill microorganisms in the air is also harmful to the eyes and exposed skin of humans.

It is not to be assumed that recent studies have in any sense negated the value of air disinfection. They have merely emphasized the importance of caution in urging processes whose real field of usefulness has yet to be determined.

It is significant to note that Wells's early studies in the schools near Philadelphia showed good results in measles and chicken pox (spread chiefly from child to child) but not for the common cold (where spread among the adults in the community plays so large a part in transmitting disease to children as to swamp any beneficial result of schoolroom disinfection).

The barracks, the school, the large industrial shop, and the large office seem to offer the area of greatest possible promise. It is here that we need serious and well controlled and long-continued experimental study, such as is now being conducted in schools in New York State and elsewhere; and a preliminary report from New York will be published in the May issue of this Journal (*American Journal Public Health*).

We should be cautious and critical, as Dr. Dyer has emphasized; but we should also be patient and open-minded. The upper respiratory infections constitute our major problem of communicable disease control in the Temperate Zone; and any procedure which can affect their incidence would represent a significant advance in public health. Abstracted by C. H. Keene from Editorial, *Am. Journ. Public Health*, April, 1947.

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That Mysterious Light,—One winter afternoon on November 8, 1895, a physicist of the University of Würzberg, was working alone in his laboratory. His equipment, crude for these days, consisted of a Crookes tube completely enclosed in black cardboard. When he passed an electric discharge through the tube, he was amazed to see a light shimmering on a bench which he knew, despite the darkened room, to be standing nearby. He could scarcely believe the evidence of his eyes. He passed another series of discharges through the tube, and again the weird light appeared. Highly excited, he lit a match and to his great surprise discovered that the source of the mysterious light was the little barium platinocyanide screen lying on the bench.

Thus Wilhelm Konrad Roentgen discovered a new light which, because of the unknown quantity, he named X-ray.

With enthusiasm and thoroughness he set to work to investigate this phenomenon. For weeks he scarcely left his laboratory, eating and even sleeping there. He found the rays were capable of piercing various substances impenetrable to light, including the soft parts of the human body. Of special significance was the fact that photographic plates were sensitive to the rays. Roentgen made a number of shadow pictures, including one of his wife's hand showing the shadow of the bones. He worked entirely alone, for his observations were of so unprecedented a nature that he did not wish to reveal them until he had ample evidence to present to his scientific colleagues. Before the end of the year, however, a preliminary report announcing his discovery was in print.

Immediately the idea swept the whole country—scientists were eager to learn more of the use of the new rays; women feared the loss of modesty; one English merchant capitalized on this fear and advertised X-ray-proof underclothing; the state legislature of one of our states had a bill introduced prohibiting the use of X-rays in opera glasses at the theater.

The medical profession, however, recognized the true scope and importance of the new rays. At first they were used only for detecting fractures and for locating foreign objects in the body. Then someone discovered that by having a patient swallow a harmless powdered mineral, barium, X-ray photographs could be made of the stomach and intestines. Gradually techniques were worked out for viewing other parts of the body. In more recent years, these same rays have been used in treatment of disease, notably cancer. It may well be that as time goes on, even more uses may be found for this strange X-ray. *Illinois Health Messenger*, May 1, 1947.

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Health Department Closes Five Restaurants,—Five eating places were closed, temporarily at least, March 20 by the (New York) city health commissioner. Three of the restaurants had their kitchens and all equipment sealed, while two others shut their doors for repairs before the health department arrived. Notice had previously been sent to six restaurants to clean up within forty-eight hours or be closed. Places closed were a sandwich shop whose manager has been fined three times since last September for lack of sanitation. A cafeteria and a delicatessen restaurant were sealed. Both places had previously been fined in court. The cafeteria did not have a permit from the health department as required by law. The two that stopped service voluntarily were a

bar and grill in Williamsburg, Brooklyn, and a catering kitchen in a church center on the West Side of Manhattan. Since the restaurant cleanup campaign began last June 6, there have been 16,963 places inspected and 2,231 summonses have been served, resulting in 2,163 fines. *Journ. A.M.A.*, Apr., 1947, p. 1229.

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Tuberculosis Diagnosis,—There are those who believe that the X-ray alone is sufficient to diagnose tuberculosis. There are a few others who believe that the tuberculin test, when positive, indicates active disease; and there are still others who are satisfied when they have obtained a negative sputum test, but it has been our experience that each of these procedures has definite indications and limitations and should be employed in the routine examination. The tuberculin test, when positive, indicates the presence of tubercle bacilli in the body. The chest X-ray will show us normal or abnormal shadows in the lung and does not necessarily rule out the presence of tuberculosis in those hidden areas of the lung not seen by the X-ray, or elsewhere in the body. The sputum examination, when tubercle bacilli are found, is the most conclusive evidence that the patient has active disease. Abstracted from the *Journal Lancet*, April, 1947, from an article by W. J. Bryan, M.D., Rockford, Ill.

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The Smoke Nuisance,—Death rates from pneumonia, tuberculosis and respiratory tract cancer provide a clear index of the damage air pollution inflicts on a city's population. All three of these diseases show a much higher death and incidence rate in badly polluted areas. The increase takes place mainly in the men who are out in the polluted atmosphere a greater portion of each day. The relation between sootfall and respiratory disease death rates is highly significant on a statistical basis, and should lead public health and housing authorities to a keener appreciation of the importance of air pollution in the high respiratory disease death rates of slum populations. Interest in air pollution and the steam locomotive's contribution is becoming keen and countrywide. Diesel engines provide the best answer to this phase of the problem, for with them the emission of water and solid particles is reduced to a minimum. Abstract from *Journ. A.M.A.*, May 3, 1947.

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English Jargon,—London, February 15. The august London Times, esteemed by all Britons as their brightest guardian of the King's English, turned its editorial wrath today on the word "personnel."

The French-derived synonym "should be classed as vermin, . . . a pest to be eliminated," the often dry-witted paper declared, with perhaps tongue-in-cheek solemnity.

"It is possible, just possible, that a more degrading, a more ill-favoured, synonym for two or more members of the human race has at one time or another been coined," the Times observed.

"But if it has, it has never gained the ubiquitous and tryannical currency of this alien collective. Personnel, though in theory they are men and women, have only to be called personnel to lose their full status as human beings.

"They do not go, they proceed. They do not ask, they make application for . . .

"They cannot eat, they can only consume; they perform ablutions; instead of homes they have places of residence in which, instead of living, they are domiciled. They are not cattle, they are not ciphers, they certainly are not human beings: they are personnel." *Health Education Journal*, Los Angeles City Schools, April, 1947.

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